

**SOFT KING
BLAST CLEANING SYSTEM
O. M. 21598**

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 **WARNING**

Do not proceed with these instructions* until you have READ the orange cover of this MANUAL and YOU UNDERSTAND its contents.

These WARNINGS are included for the health and safety of the operator and those in the immediate vicinity.

***If you are using a Clemco Distributor Maintenance and Part Guide, refer to the orange warnings insert preceding the Index before continuing with the enclosed instructions.**

Electronic files include a Preface containing the same important information as the orange cover.

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AEROLYTE Systems®

1.0 INTRODUCTION

1.1 Scope: This manual covers set-up, operation, maintenance, troubleshooting, and replacement parts for Aerolyte Soft King bicarbonate of soda blast cleaning machines. The following separate instruction manual is provided for the remote control handle.

RLX Control Handle, Manual No.10574

Do not operate the machine without first reading the control handle and accessory operating instructions.

1.1.2 These instructions contain important information that is required for safe operation of the machine. The operator must be qualified to safely operate the blast machine and remote controls, and all other equipment used with the blast machine. To ensure safe blasting, all operators and personnel involved with the abrasive blasting process must read and understand the manual, including the information included in the orange cover, for all devices used with the blast machine.

1.1.3 The Clemco booklet "Abrasive Blasting Safety Practices" is included with every blast machine, and contains important safety information about abrasive blasting that may not be included in equipment operation manuals. Copies are available from Clemco Industries and may be requested through our website www.clemcoindustries.com or requested via email to info@clemcoindustries.com.

1.2 Safety Alerts

1.2.1 Clemco uses safety alert signal words, based on ANSI Z535.4-1998, to alert the user of a potentially hazardous situation that may be encountered while operating this equipment. ANSI's definitions of the signal words are as follows:



This is the safety alert symbol. It is used to alert the user of this equipment of potential personal injury hazards.

Obey all safety messages that follow this symbol to avoid possible injury or death.

CAUTION

Caution used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

CAUTION

Caution indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

WARNING

Warning indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

DANGER

Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

1.3 General Description

1.3.1 The Soft King Blast Machine is designed for use in a wide variety of blasting applications, and has the following distinctive features:

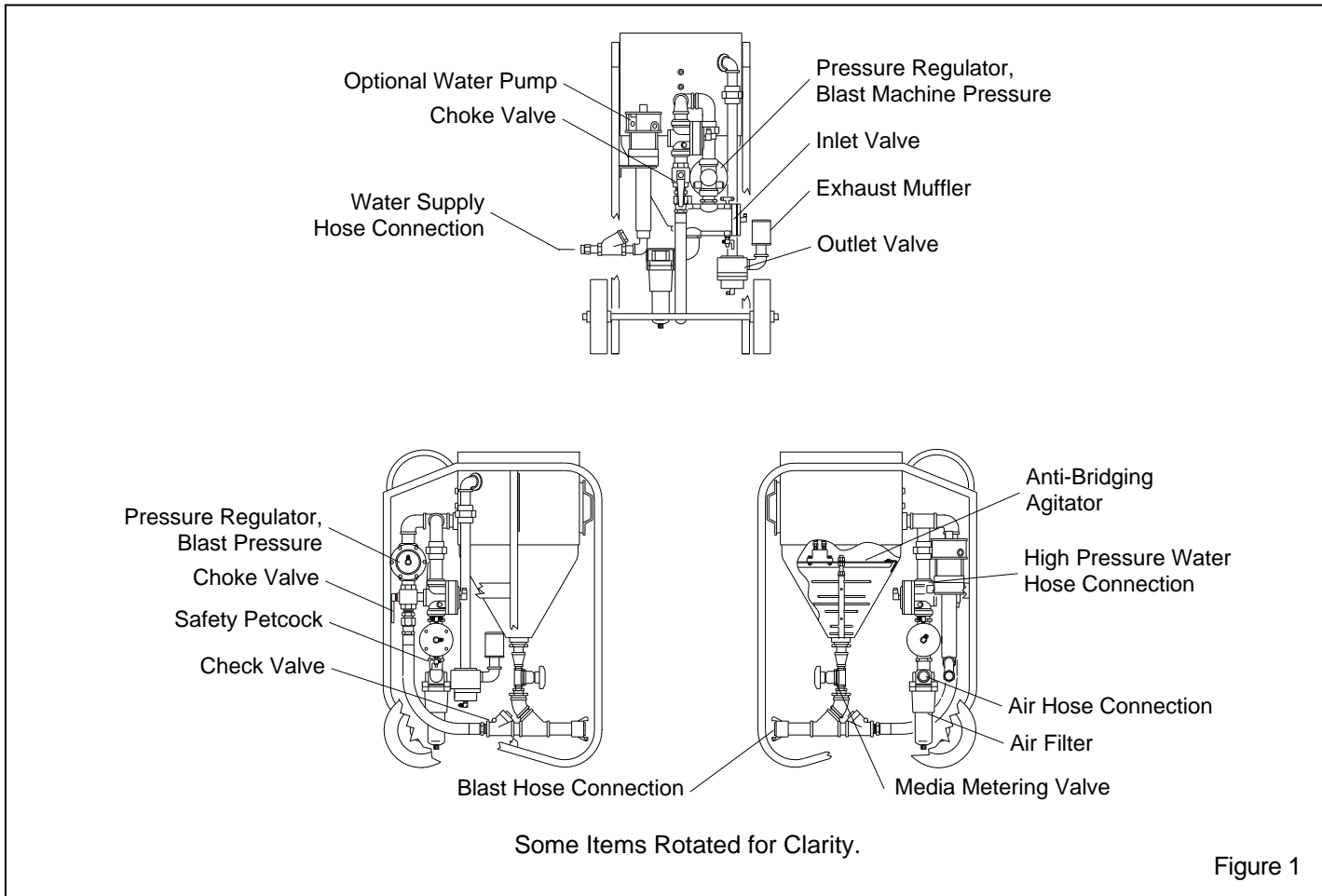
- Operates within a pressure range of 5 psi to 150 psi for delicate surfaces at very low pressure or difficult jobs at high pressure.
- Can be used for dry blasting or wet blasting.

1.4 Components and Operating Principles

1.4.1 The main components of the machine are shown in Figure 1. They include the blast machine with anti-bridging agitator, remote controls, pressure regulators, moisture separator/filter, and water injector.

1.4.2 Blast Machine

1.4.2.1 Clemco blast machines (pressure vessels) are manufactured to American Society of Mechanical Engineers (ASME) standards, as described in Section VII, Div. 1, and carry a National Board certification. It is the owner's responsibility to maintain the integrity of the vessel as may be required by some states. This may include regular inspection and hydrostatic testing as described in National Board Inspection Code and Jurisdictional Regulations and /or Laws.



⚠ WARNING

Welding, grinding, or drilling on the blast machine could weaken the vessel. Compressed air pressure could cause a weakened blast machine to rupture, resulting in death or serious injury. Welding, grinding, or drilling on the blast machine vessel, without a National Board "R" stamp voids the ASME and National Board certification.

1.4.2.2 All welding repairs done on the vessel must be performed by certified welders, at shops holding a National Board "R" Stamp. Welding performed by any welder not properly qualified per the ASME Code voids ASME and National Board certification of the vessel.

1.4.2.3 The Soft King blast machine is rated for a maximum of 150 psi (pounds per square inch); do not exceed the rated pressure.

⚠ WARNING

Excessive air pressure could cause a blast machine to rupture. To prevent serious injury or death, do not exceed the rated pressure of the blast machine vessel.

1.4.2.4 Blast machines DO NOT require pressure relief valves when air compressors supplying air to the blast machines are built to ASME⁽¹⁾ specifications and comply with OSHA⁽²⁾ regulations. ASME Manual section VIII, Division 1, UG-125, paragraph A90 (g) states pressure relief valves or protective devices "...need not be installed directly on a pressure vessel when the source of pressure is external to the vessel and is under such positive control that the pressure in the vessel cannot exceed the maximum allowable working pressure at the operating temperature...". OSHA regulation 1910.169 references the above ASME code when describing the necessity of pressure relief valves on compressed air equipment. DO NOT use air compressors that are not equipped with suitable pressure relief valves in working order.

⁽¹⁾ American Society of Mechanical Engineers, Boiler and Pressure Vessel Code, 1989

⁽²⁾ Occupational Safety and Health Administration, 29 CFR 1910, Subpart M - Compressed Gas and Compressed Air Equipment.

1.4.2.5 The blast machine is equipped with remote controls that allow the operator to pressurize the machine to start blasting, and depressurize it to stop blasting, from the nozzle.

1.4.2.6 An anti-bridging agitator ensures continuous media flow. Agitator pressure, which controls its frequency is adjusted by a pressure regulator mounted on the panel.

1.4.3 Remote Controls

1.4.3.1 Aerolyte remote controls operate pneumatically on the "return air" principle. The control handle, located near the blast nozzle, is the activator for the remote control system. When the control handle lever is in the up (no blast) position, air travels down the outbound twinline and escapes through an opening located under the lever. When the control handle lever is pressed, the opening is sealed, and air in the outbound line flows through the return line to open the inlet valve and close the outlet valve. The pop-up valve automatically closes as the blast machine pressurizes, and blasting begins. Releasing the handle exhausts the control air, which closes the inlet valve, and opens the outlet valve to depressurize the blast machine and stop the blasting.

1.4.3.2 The remote control system is an OSHA-required safety device. When the operator intentionally or unintentionally removes hand-held pressure from the remote control handle, the machine depressurizes, stopping air and media flow through the nozzle. The remote control system "fails to safe", which means any interruption in the control-air circuit for reasons, such as a break in the line, the compressor stops running, or the operator drops the blast hose, the remote controls deactivate the blast machine.

WARNING

Never modify or substitute remote control parts. Parts from other manufacturers are not compatible with Clemco equipment. If ANY part of the remote control system is altered, involuntary activation, which may cause serious injury, can occur.

1.4.4 Pressure Regulators

1.4.4.1 The Soft King is furnished with four pressure regulators to perform the following functions:

- Blast pressure regulator: controls blasting pressure.
- Blast machine regulator: controls differential pressure between the blast pressure and blast machine pressure. Blast pressure should never be higher than blast machine pressure.
- Agitator regulator: controls the frequency of vibration used on the anti-bridging system.
- Water pump regulator: controls air inlet pressure to the water pump.

1.4.5 Moisture Separator/Filter

1.4.5.1 Compressed air passes through the filter, removing condensed moisture before entering the machine. Water is drained by use of a manual drain, at the bottom of the filter.

1.4.6 Optional Water Injector

1.4.6.1 The water injector system includes the following items:

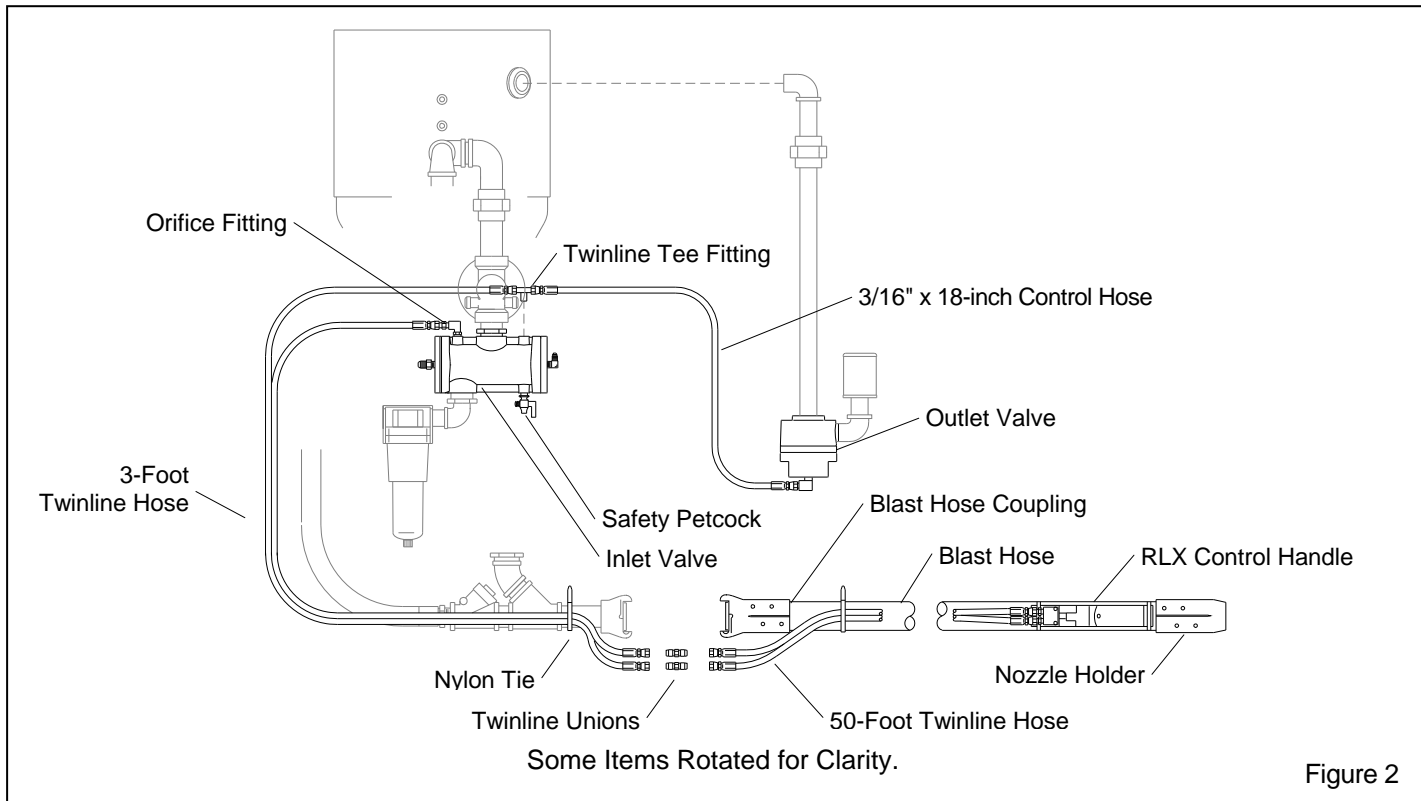
- 4:1 air-driven water pump.
- Nozzle adaptor: threads to the end of the blast hose between the nozzle holder and nozzle.
- High-pressure water hose: delivers water from the pump outlet to the nozzle adaptor.
- Water shutoff valve: located at the end of the high-pressure hose, enables the operator to start and stop the water flow without changing the flow adjustment.
- Needle control valve: attached at the end of the high-pressure hose between the shutoff valve and nozzle adaptor, regulates the volume of water.

1.4.6.2 The injector allows the machine to be used for wet or dry blasting. Wet blasting (injecting water into the blast stream) eliminates dust, and increases the removal of residual dust particles and water-soluble corrosive salts. The pump is disabled when the control handle is released.

1.4.6.3 The water injector enables the operator to isolate or combine any of the four following functions:

- Dry media blasting
- Wet media blasting
- Washing down
- Air drying

1.4.6.4 The water source can be from either a static water tank, or a faucet. If a rust inhibitor is required, premix the solution in a static water tank.



2.0 SET-UP

These instructions include set-up for wet blasting. If the system does not include the wet blast option or if wet blasting is not required, omit from set-up.

2.1 Blast Hose and Control Hose Connections, Refer to Figure 2.

2.1.1 Uncoil and stretch out the blast hose, and lay the 50-foot twinline hose and high-pressure water hose alongside it. Hoses should be of equal length.

2.1.2 Band the control handle to the blast hose just behind the nozzle holder, using the nylon ties provided. Clip the tie ends so they will not snag clothing or interfere with the operation of the control handle.

2.1.3 Attach the 50-foot twinline hose to the two fittings on the control handle. Either line can be attached to either fitting.

2.1.4 Screw the wetblast adaptor into the nozzle holder. Make sure a nozzle washer is seated in the holder, ref. Figure 3. The injector flange should seat tightly against the washer.

2.1.5 Connect the high-pressure water hose to the shutoff valve located on the nozzle adaptor assembly. To facilitate the connection, the end of the high-pressure

hose that connects to the shutoff valve, is equipped with a male swivel connector.

2.1.6 Working from the control handle back, band or tape the twinline hose to the blast hose every four to six feet, and as close to the couplings as possible. The water hose may not always be used; therefore it should be left separate for easy removal.

2.1.7 Make sure the coupling gaskets are in place and in good condition before connecting the blast hose to the quick coupling on the blast machine. When connecting the hose, make sure the coupling spring lock pins are at 180 degrees (Pins should enter the unused hole of the adjoining coupling). The spring lock pins help prevent accidental separation of hose couplings during blasting. Safety cables are listed in Section 8.1 of this manual.

⚠ WARNING

Hose disconnection while under pressure could cause serious injury or death. Use safety lock pins and safety cables on all coupling connections to help prevent hose couplings from accidental disconnection.

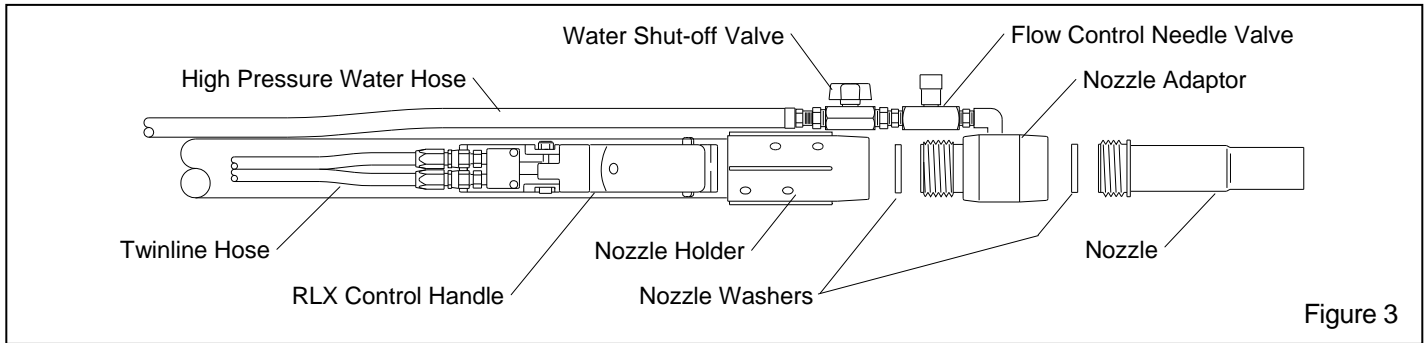


Figure 3

2.1.8 Connect one end of the 3-foot twinline control hose to fitting No. 1 (orifice fitting) and No. 2 (tee fitting) on the inlet valve.

2.1.9 Use the unions provided to connect the other ends of the 3-foot twinline hose to the 50-foot twinline hose. Either hose line can go to either union.

2.1.10 Band the 3-foot twinline hose on the blast machine side of the unions to the quick coupling nipple.

2.1.11 Attach the high-pressure water hose to the water pump outlet. To facilitate the connection, the pump end of the high-pressure hose is equipped with a quick disconnect.

2.1.12 Screw the nozzle into the nozzle holder or wetblast adaptor if used, make sure the nozzle washer is in place.

CAUTION

Make sure all fittings are tight. Leaks will cause the system to malfunction.

2.2 Air Hose Connection

2.2.1 Connect the air hose from the compressor to the air filter inlet. For best blasting performance, use 1-1/4" ID or larger air line when using up to a 5/16" nozzle, and 1-1/2" or larger when using up to 1/2" nozzle.

2.3 Water Hose Connection

2.3.1 The water hose should be at least 3/4" ID. The water source may be from a faucet or from a static water tank.

2.3.2 Before connecting the water hose to the water pump, turn on the water supply to clear debris from inside the hose, and to clean the hose connection.

2.3.3 Turn off the water supply, and attach the hose to the water pump inlet.

2.4 Agitator Check

2.4.1 During the initial set-up, make sure the agitator assembly is correctly in place. See Section 6.6.

3.0 OPERATION

3.1 Start-Up

3.1.1 Make sure all hose connections are secure and that lock pins are in place.

3.1.2 Inspect blast hose for wear; look for soft spots. Replace if worn.

3.1.3 Make sure the choke valve is open. The valve is open when the handle is in-line with the valve.

3.1.4 Close the media metering valve. The valve is closed when the knob is turned fully clockwise.

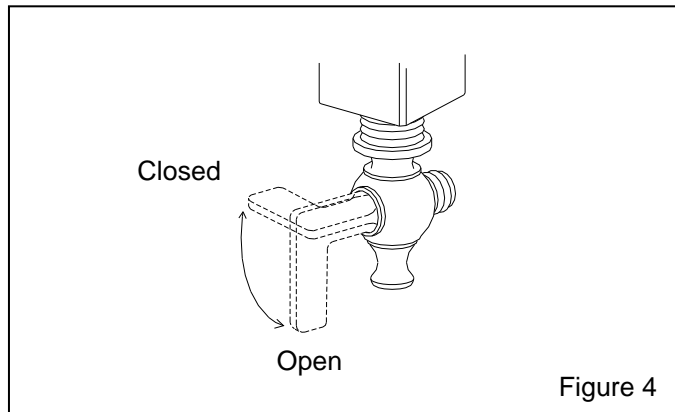
3.1.5 Make sure that the control handle lever is in the up (no blast) position, and that the handle lever and safety lock move freely. Make sure that it will not engage unless the safety lever lock is pulled down.

⚠ WARNING

Malfunctioning control handles could cause unintentional actuation of a blast machine, or prevent a machine from deactivating upon release. Malfunctioning control handles must be taken out of service immediately and repaired or replaced. Serious injury or death can result from unintentional blasting.

3.1.6 Locate the compressor upwind from the blasting operation to prevent contaminated air from entering the compressor intake. Start the compressor, and bring it up to operating temperature and pressure. The pressure must be more than 50 psi (pounds per square inch) but no more than 150 psi.

3.1.7 Make sure that the safety petcock located on the lower side of the inlet valve is open. Open position is when the lever is in-line with the petcock, as shown in Figure 4.



⚠ WARNING

To prevent severe injury from accidental activation of the blast machine, open the safety petcock when the blast machine is not in use. Opening the petcock prevents unintentional blasting. The control handle can not activate the machine when the petcock is open.

3.1.8 Slowly open the compressor supply valve to pressurize the air supply line. Listen for any open lines or leaks.

3.1.9 If wet blasting, follow the additional start-up instructions in Section 3.2.

3.1.10 Adjust the pressure regulators for the anti-bridging agitator, blast pressure, and blast machine pressure. See Section 4.0.

⚠ WARNING

Always open the safety petcock before filling the machine with media. This step is especially important if a pot tender loads the machine with media while another worker operates the control handle, and can pressurize the machine before the tender is ready. Media could be forced out of the top of the machine when the machine is pressurized and cause injury.

3.1.11 Load media into the machine by following the instructions in Section 3.7.

3.1.12 When the blast operator is ready to blast, either the operator or the machine tender, while standing back and facing away from the concave filling head of the blast machine, closes the safety petcock. Closing the petcock prepares the machine for remote operation and activation by the control handle. Air should be heard escaping from the orifice under the control handle lever but nowhere else. The noise from air escaping at the control handle is an audible signal that air is supplied to the blast machine, and will activate if the control handle is pressed.

3.2 Additional Start-Up for Wet Blasting

3.2.1 Close the water-shutoff valve located on the wetblast adaptor.

3.2.2 Open the water supply valve (faucet).

3.2.3 The water pump pressure regulator controls the air supply to the water pump. Adjust pump pressure per Section 4.4. Set the pressure to 0 psi when the water injector system is not in use.

NOTE: The pump will not energize until the remote control handle is pressed.

3.3 Blasting Attire

3.3.1 Operators and **anyone else that may be exposed to the hazards generated by the blasting process** must wear appropriate protective gear, including abrasive-resistant clothing, leather gloves, eye and hearing protection, and a NIOSH-approved Type CE Supplied-Air Respirator.

 **WARNING**

Before blasting, test the coating and substrate for toxic materials (such as lead or other heavy metals, or asbestos). These hazards require special measures to protect the operators and the environment.

No dust is safe to breathe. Abrasive blasting produces harmful dust. Failure to wear approved respirators could result in serious lung disease or death. Blast operators must wear properly fitted and maintained NIOSH-approved, type-CE supplied-air respirators approved for abrasive blasting.

During abrasive blasting, abrasive particles and dust in the area around the blast machine and blast nozzle become airborne. Everyone working in the vicinity of abrasive blasting must wear properly-maintained, NIOSH-approved, respiratory protection appropriate for the job site hazards.

Loud noise generated by the use of compressed air could cause hearing damage. Everyone in the blasting area must wear approved eye and hearing protection.

3.4 Blasting

- 3.4.1** Don all protective blasting attire per Section 3.3.
- 3.4.2** Hold the blast hose securely and point the nozzle only at objects intended to be blast cleaned.
- 3.4.3** Pull back the safety lever lock and depress the remote control handle. Be prepared as blasting will begin within a few seconds.

 **WARNING**

OSHA requires the use of remote controls on all blast machines when an operator controls the nozzle. To comply with OSHA regulations, the remote control handle, which starts and stops the flow of air and abrasive, must be held down manually. Do not tie down the control handle lever or attempt to bypass any part of the remote control system. Doing so will defeat the purpose of the fail-to-safe feature of the remote control. Serious injury or death could result from uncontrolled blasting. Ref. 29 CFR 1910.244 (b).

3.4.4 If the media valve was closed as instructed in Paragraph 3.1.4, only air will come out the nozzle.

3.4.5 Adjust media flow per Section 4.1.

3.4.6 If wet blasting, open the water-shutoff valve, and adjust water flow per Section 4.5.

3.5 Stop Blasting

3.5.1 If wet blasting, close the water shutoff valve.

3.5.2 When the control handle lever is released, the control handle safety lever will flip up to lock the handle lever in the up (no blast) position.

3.5.3 Make sure that the control handle safety lever lock is up, and that it prevents the handle lever from engaging.

3.5.4 Always open the safety petcock during work breaks and before filling the blast machine. Opening the petcock prevents unintentional blasting.

3.6 Shut-Down

3.6.1 Shut-down for wet blasting. If not wet blasting, skip to Section 3.6.2.

3.6.1.1 Turn off the water supply valve (faucet).

3.6.1.2 Set the water pump pressure regulator to 0 psi.

3.6.1.3 Point the nozzle down and open the water-shutoff valve to drain the water hose. Do not permit water to enter the blast hose.

3.6.1.4 If wet blasting is complete, detach the water supply hose from the water pump inlet.

3.6.1.5 Shutdown dry blasting per Section 3.6.2.

3.6.2 Shutdown for dry blasting

3.6.2.1 Empty the machine per Section 3.8.

3.6.2.2 When finished blasting, and after cleanup is completed, remove the respirator outside the respirator-use area and where the air is safe to breathe.

3.6.2.3 Close the compressed-air supply valve at the compressor.

3.6.2.4 Drain receiver tank, filters, and water collecting devices, and bleed the compressed-air supply hose.

3.6.2.5 Shutdown the compressor.

3.6.2.6 Cover the blast machine when not in use.

3.7 Loading Media into the Blast Machine

WARNING

When approaching an idle blast machine, and before loading the blast machine with abrasive, always check to make sure the safety petcock is open. If it is closed, open it while standing back and facing away from the concave head and exhaust muffler. This step is especially important if one worker (a machine tender) loads the machine with abrasive while another worker (the blast operator) controls the blasting. The blast operator could pressurize the machine before the machine tender has moved away from the machine. During pressurization, abrasive could be forced out of the top of the machine, and cause injury.

3.7.1 Load media into the machine by pouring it into the concave head. Use an optional screen placed over the head to prevent objects from falling inside. Foreign objects will jam the machine. Media flows through the filling port into the machine. Keep the media level below the pop-up valve. Media resting on the pop-up valve could be forced up and out of the top of the machine when the machine is pressurized.

3.7.2 When the blast operator is ready, either the operator or the machine tender, while standing back and facing away from the blast machines concave filling head, closes the safety petcock.

3.8 Empty Media from the Blast Machine

3.8.1 Empty the machine of all media when shutting down for the day. This will eliminate trouble from moist media when starting a new day's blasting. One way to avoid having to empty the machine is to load only as much media as will be used during the work period. If the machine must be purged of media, do the following.

3.8.2 With the blast machine off, adjust the blast pressure regulator to 0 psi.

3.8.3 Close the choke valve, and open the media metering valve by turning the knob fully counterclockwise.

3.8.4 Direct the media discharge into a container suitable to hold the media.

3.8.5 While holding the hose securely, press the control handle and turn the blast pressure regulator up slowly until the machine pressurizes (usually around 5 psi). A heavy flow of media will be discharged out the nozzle.

3.8.6 When the machine is empty, release the control handle lever, open the safety petcock, and return the choke valve to the full open position.

4.0 ADJUSTMENTS

4.1 Media Metering

4.1.1 Adjust media flow by turning the knob on the metering valve. The valve is closed when the knob/handle is fully clockwise. To adjust, close the valve and slowly turn the knob counterclockwise to increase media flow. Use as little media as possible to do the job while maintaining the best cleaning rate. Generally, with the correct mixture, media should barely be seen as light discoloration as it exits the nozzle.

4.1.2 Some conditions such as fine media, moist air, or high ambient humidity, affect media flow. Increased blast machine pressure and adjustment of the anti-bridging agitator may be required. See Section 4.2 blast pressure adjustment and 4.3 agitator adjustment.

4.2 Blast Pressure and Blast Machine Pressure

4.2.1 The blast pressure regulator and blast machine regulator must initially be set at the same pressure. Most blasting should be done using balanced pressure (when blast pressure and blast machine pressure are the same).

4.2.2 Blast pressure regulator

4.2.2.1 Blasting pressure (the pressure coming out the nozzle) is set by adjusting the blast pressure regulator.

4.2.2.2 Blast pressure may be regulated between a low 5 psi to a maximum of 150 psi. Most bicarbonate of soda blasting is done between 30 and 60 psi. The following chart shows pressure starting points for typical applications.

Application	psi
Cleaning masonry	55
Graffiti removal	55
Dry stripping on delicate substrates	5-50
Coating removal from durable substrates	15-90
Degreasing	5-25

4.2.3 Blast machine regulator

4.2.3.1 The blast machine pressure regulator is used to increase the machine pressure to a setting slightly higher than blast pressure. This should be done only when media is unable to flow when the pressure is balanced. Once the pressure differential is set, it will remain constant regardless of the blast pressure. For example: If blast pressure is set at 50 psi and the blast machine pressure is set at 51 psi, when blast pressure is reduced to 25 psi, blast machine pressure is automatically reduced to 26 psi. The blast machine pressure should never be set lower than blast pressure. Adjust as follows:

4.2.3.2 Adjust the blast pressure regulator to 50 psi.

4.2.3.3 Adjust the blast machine regulator to 50 psi. Both the blast gauge and blast machine gauge should register as the regulator is turned.

4.2.3.4 Start blasting and adjust the media metering valve per Section 4.1.

4.2.3.5 If media flow is too rich (too much media), decrease blast machine pressure by 0.5 psi increments, readjusting the media valve after each setting until the correct mixture is obtained.

4.2.3.6 If media flow is too lean (too little media), increase blast machine pressure by 0.5 psi increments, readjusting the media valve after each setting until the correct mixture is obtained.

CAUTION

Try to obtain a consistent media flow through media metering and the anti-bridging agitator. Operating the machine with unbalanced pressure may accelerate wear on the media metering valve and lower piping.

4.3 Anti-Bridging Agitator

4.3.1 Aerolyte's unique anti-bridging system is adjusted by the agitator pressure regulator mounted on the panel. NOTE: The agitator will not energize until the remote control handle is pressed.

4.3.2 If media tends to bridge through the metering valve, activate the agitator by turning the regulator to 40 psi. Increase or decrease pressure as needed to find optimum resonation.

4.4 Wetblast Injector Pump Pressure

4.4.1 The injector pump operates at a 4:1 pressure ratio. The pump will pressurize water four times greater than the air pressure used to drive the pump. Example: If the pumps air inlet pressure is set at 30 psi, the water outlet pressure will be 120 psi ($4 \times 30 = 120$)

4.4.2 Water pressure needs to be high enough to overcome blast pressure and atomize the water. The minimum water pressure should be 1-1/2 times the blast pressure. For example if blast pressure is 40 psi, water pressure should be a minimum of 60 psi. Since the pump is 4:1, air pressure for the pump should be set at a minimum of 15 psi. ($40 \times 1.5 = 60 \div 4 = 15$).

4.4.3 If water pulsates during blasting, the pump pressure may need to be increased. See Water Flow in Section 4.5

CAUTION

The pump is designed to operate within the range of 10 to 100 psi air pressure. Pressure higher than 100 psi may damage the pump. A relief valve is plumbed into the controls to prevent excessive pressure. DO NOT by-pass the relief valve.

4.5 Water Flow, Volume

4.5.1 Water flow is controlled by the shut-off valve located on the nozzle adaptor, and upstream of the needle valve (ref Figure 3). This valve enables the operator to start and stop wet blasting without changing the water flow rate.

4.5.2 Water flow rate is adjusted by the needle valve attached to the nozzle adaptor. Open the valve only as much as necessary to atomize the water and saturate the media to control dust.

4.5.3 If water pulsates while blasting, one of two conditions is occurring. The needle valve is either open too far, or the pump pressure is too low. Adjust the pump pressure and needle valve together to obtain a steady water flow and atomization. Maximum water flow is approximately 2.6 gallons per minute.

5.0 PREVENTIVE MAINTENANCE

NOTE: These preventive maintenance instructions pertain to the blast machine and remote controls only. Read the owners manuals for all blast accessories, for their inspection and maintenance schedules.

5.1 Daily

5.1.1 With the air off, before blasting, do the following:

- Inspect the blast hose for wear; look for soft spots. Soft spots mean the hose is worn. Replace the blast hose before the tube wears as far as the fabric plies.

WARNING

Worn blast hose could suddenly fail by bursting. Couplings and nozzle holders may not adequately grip worn hose causing them to blow off under pressure. Compressed air and abrasive escaping from a burst hose, or disconnected coupling or nozzle holder, could cause severe injury.

- Check to make sure that couplings are secure and lock pins and safety cables are in place.
- Make sure the nozzle washer is in place and not worn.

WARNING

The threads on the nozzle and nozzle holder must be inspected each time the nozzle is secured to the holder. Check that the threads are not worn, and that the nozzle holder securely grips the nozzle. The nozzle washer must also be inspected for wear. Worn nozzle washers cause thread erosion. A loose fitting nozzle may eject from the holder under pressure and could cause severe injury.

- Inspect the RLX Control Handle; refer to the control handle manual and inspect the following:
- The lever must not seal the opening on the control unless the safety lever lock is pulled down.
- The **handle lever** must return to the "up" position when released.
- The **safety lever lock** must return to the "up" position when the handle lever is released.
- Both the handle lever and safety lever lock must move freely with no drag or binding.

WARNING

Malfunctioning control handles could cause unintentional actuation of a blast machine, or prevent a machine from deactivating upon release. Malfunctioning control handles must be taken out of service immediately and repaired or replaced. Serious injury or death could result from unintentional blasting.

5.1.2 During blasting, do the following:

- Check the control handle for leaks. Refer to the control handle manual.
- Inspect all couplings and coupling gaskets for leaks.
- Check the blast machine for leaks. If leaks are found around the pop-up valve, inspection door, or pipe-fittings at the bottom of the cone, stop blasting immediately and repair or replace worn parts. If leaks are allowed to continue, abrasive erosion could cause irreparable damage to the blast machine.
- Check all external piping, control hoses, and valves for leaks. If leaks are found, stop blasting and repair.
- Inspect blast hose, couplings, and nozzle holders for leaks. At the first sign of a leak, stop blasting and inspect all items for wear.

WARNING

Leaks around couplings and nozzle holders indicate worn or loose-fitting parts. Nozzle holders and couplings that do not fit tight on hose, and nozzles that do not fit tight in nozzle holders could disconnect while under pressure. Impact from nozzles, couplings, hoses, or abrasive, from parts disconnected by pressure during operation could cause severe injury.

5.2 Weekly

5.2.1 With the air off, before blasting, do the following:

- Remove the nozzle for inspection. Replace if the diameter is worn 1/16" or more, or if the liner is cracked.
- Inspect the air filter element, and clean the bowl.

5.2.2 During Blasting do the following:

- Note the time it takes to fully depressurize the machine after the control handle is released. When depressurizing time increases noticeably, inspect the exhaust muffler per Section 6.5.

5.3 Monthly inspection

5.3.1 With the air off, before blasting, do the following:

- Check the pop-up valve's urethane coating for cracks and grooves. Replace the pop-up valve at the first sign of wear. See Section 6.3.
- Inspect the rubber pop-up seal, and replace at the first sign of wear, drying, or cracking. See Section 6.4.
- Inspect the exhaust muffler for blockage and wear, per Section 6.5.
- Inspect agitator system. See Section 6.6.

5.4 Periodic Inspection

5.4.1 After transporting check to make sure that the agitator assembly is in place. See Section 6.6. NOTE: Keeping the machine upright during transporting will prevent the agitator from falling out of place.

5.4.2 The remote control system is a safety device. For safety and to avoid unscheduled down-time, periodically inspect the internal parts of the inlet valve and outlet valve. Inspect for wear and lubrication of O-rings, pistons, springs, seals, and castings. Refer to Section 6.0 for service maintenance.

5.4.3 The control handle is the actuator of the remote control system. Periodically clean around the springs, handle lever, and safety lever lock to ensure that the unit is free of abrasive and debris that may cause the handle lever or safety lever lock to bind. Refer to the RLX Owners Manual for service instructions.

5.5 Lubrication

5.5.1 Once per week while the air is off, put one or two drops of light weight machine oil in the inlet valve through the safety petcock. This will lubricate the piston and O-rings in the inlet and outlet valves.

6.0 SERVICE MAINTENANCE

WARNING

Failure to observe the following before performing any maintenance could cause serious injury or death from the sudden release of compressed air.

- **Depressurize the blast machine.**
 - **Lockout and tagout the compressed air supply.**
 - **Bleed the air supply line to the blast machine.**
-

6.1 Inlet Valve Inspection and Service. Refer to Figure 5.

6.1.1 Using a 6-mm hex key, remove the four socket head cap screws from each cover plate, and remove both cover plates and gaskets.

6.1.2 The inlet piston assembly must be taken apart before it can be removed from the body. To dismantle the piston assembly, insert the peg spanner (Clemco Stock No. 100027) into the two bore holes in the end of the piston, while using a 6-mm hex key to remove the countersunk hex screw.

6.1.3 Using a wooden dowel or similar object, apply pressure through the screw hole to push the piston out the inlet side.

6.1.4 Remove the U-seal piston and U-seal assembly.

6.1.5 Carefully remove the U-seal remaining in the body.

6.1.6 Clean all items and inspect for wear. Replace worn or damaged parts. The U-seals must fit snug against the valve body and pistons.

6.1.7 Place a U-seal into the groove in the valve body. The open side of the seal must face the inlet as shown.

6.1.8 Place a U-seal on the U-seal piston as shown in Figure 7. The smaller lip on the open side of the seal must fit within the groove as shown.

6.1.9 Lubricate U-seals with a silicon-based valve lubricant.

6.1.10 Insert the U-seal piston assembly into the body. The countersunk side of the piston faces outside as shown in Figure 5.

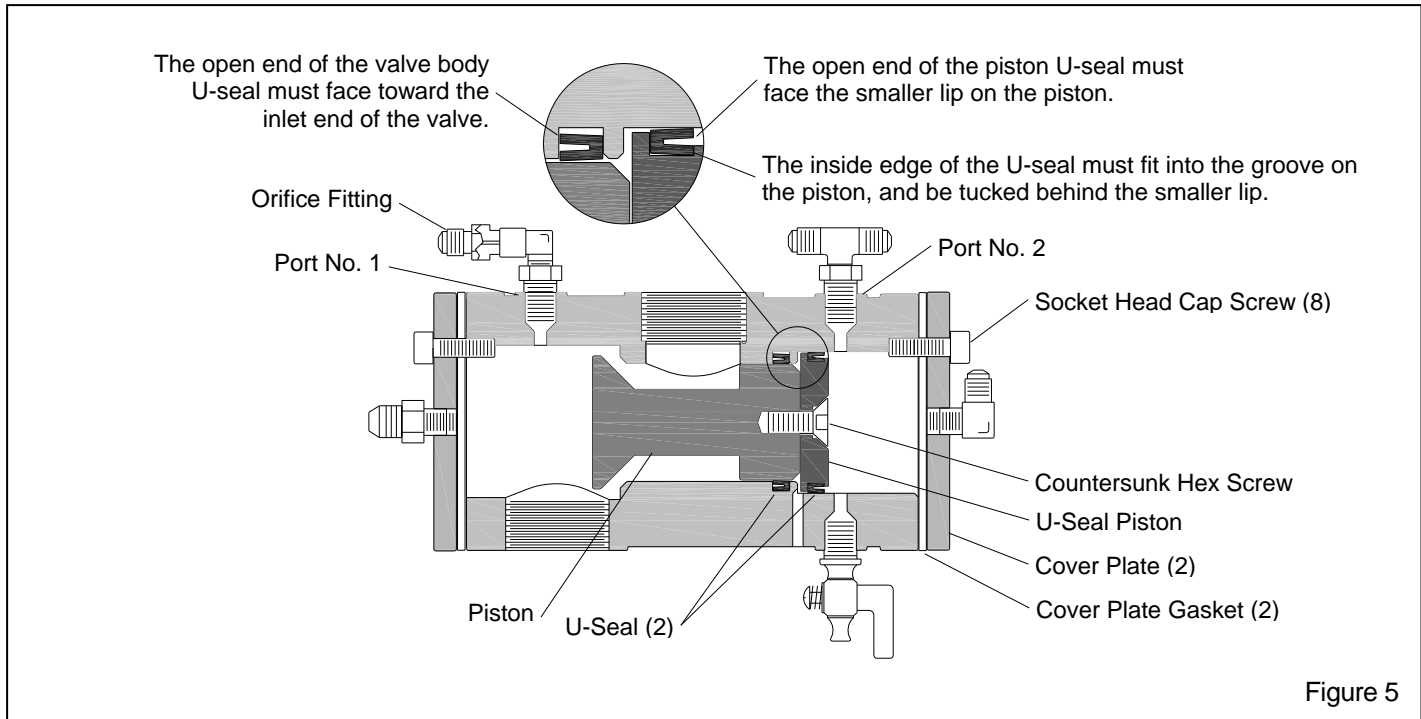


Figure 5

6.1.11 Insert the countersunk screw. Use the peg spanner and hex key to tighten the screw securely.

6.1.12 Replace both cover plates and gaskets, using new gaskets if the used ones are damaged.

6.1.13 If fittings on the body were removed, be certain the .052" orifice fitting is screwed into port number 1.

6.2 Outlet Valve Inspection and Service. Refer to Figure 6

6.2.1 Using a 6-mm hex key, remove the four socket head cap screws from the upper body.

6.2.2 Carefully separate the lower body, piston guide and piston assembly, and diaphragm.

6.2.3 Clean all items and inspect for wear. Replace worn or damaged parts.

- Replace the diaphragm if the surface is worn.
- The U-seal must fit snug against the lower body and piston.
- Examine the upper body and outlet pipe fittings for wear.

6.2.4 If the piston guide and piston assembly need to be dismantled, insert the peg spanner into the two bore holes in the end of the diaphragm piston, while using a 6-mm hex key to remove the countersunk hex screw.

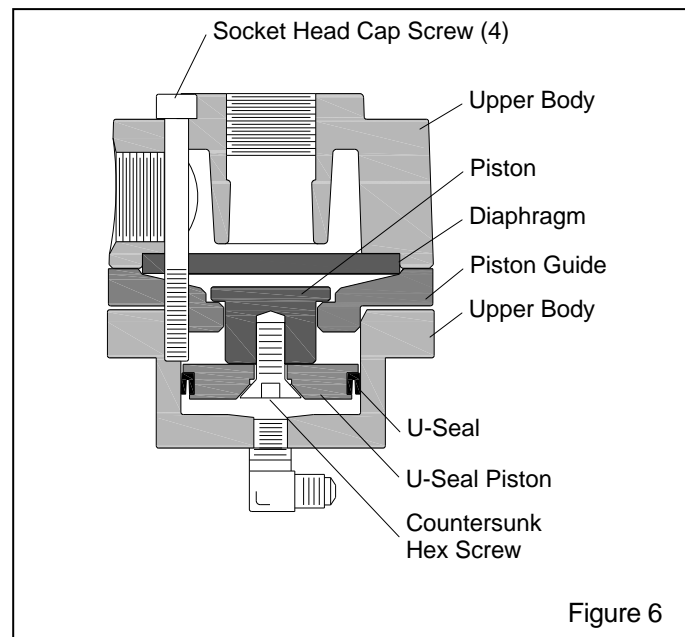
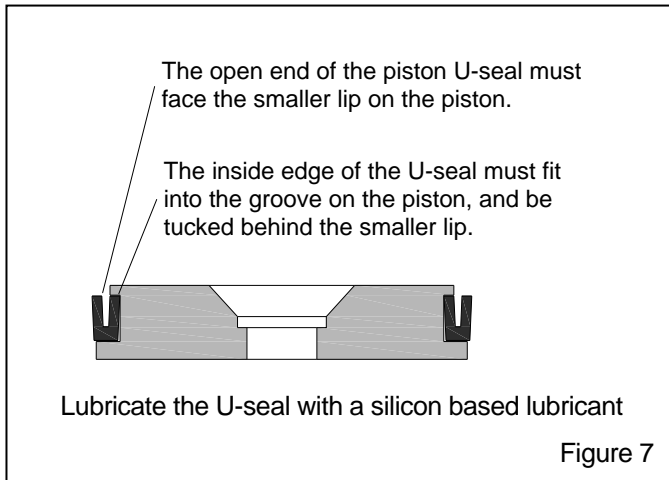


Figure 6

6.2.5 Place a U-seal on the U-seal piston as shown in Figure 7. The smaller lip on the open side of the seal must fit within the groove as shown.

6.2.6 Reassemble in reverse order. The diaphragm piston must be toward the diaphragm, and the U-seal piston must fit snug into the lower body.



6.2.7 Inspect the exhaust muffler per Section 6.5 before reassembly.

6.3 Replacing the Pop-Up Valve

6.3.1 To gain access to the pop-up valve, remove the inspection door assembly.

6.3.2 Use a small pipe wrench to unscrew the pop-up valve guide, by turning it counter-clockwise. Remove the pop-up valve and guide from the machine.

6.3.3 Slide the new guide over the pop-up valve stem. Screw the valve guide (with the pop-up valve in it) into position inside the machine. Tighten the guide snug with a wrench, but not wrench-tight. Over-tightening the guide will make it difficult to remove, next time the pop-up valve needs replacement.

6.3.4 Put a new gasket on the inspection door assembly before bolting the door back onto the machine.

6.4 Replacing the Pop-Up Seal

6.4.1 Remove the old seal using fingers, screwdriver, or similar object, to work the seal out of the retaining groove.

6.4.2 Push the new seal all the way through the port and then fit it into the retaining groove. For the last few inches, pull up on the seal and allow it to pop into position.

6.5 Cleaning the Exhaust Muffler.

6.5.1 Clean or replace the muffler body when depressurizing time increases noticeably. (Average time to depressurize the blast machine is approximately 2-3 seconds).

6.5.2 To clean, remove the lock-nuts and screws, separate the parts, and clean the interior of the body with

solvent or compressed air. If the interior is so clogged that these methods do not clear the muffler, it must be replaced. The cap must also be replaced, if the urethane coating is worn away.

6.6 Inspect Agitator System

6.6.1 Empty the machine of media. Turn off the air supply. Lock-out and tag-out the air supply.

6.6.2 To gain access to the agitator, remove the inspection door assembly.

6.6.3 Make sure that all fasteners on the tree assembly are tight.

6.6.4 Make sure that all hose connections are tight.

6.6.5 Inspect mounting pads. Replace before rubber wears to the metal.

6.7 Media Metering Valve

6.7.1 Empty the machine of media. Turn off the air supply. Lockout and tagout the air supply and bleed the air line.

6.7.2 Turn the metering knob counterclockwise to fully open.

6.7.3 Remove the four cap screws securing the cover and remove the cover.

6.7.4 Remove the rubber diaphragm.

6.7.5 Inspect all parts, replacing any that are worn.

6.7.6 Reassemble in reverse order. Tighten cap screws uniformly.

6.8 Removing Damp Media or Clearing Obstructions From the Blast Machine

6.8.1 To clear minor obstructions or damp media: with the machine in operation, rapidly open and close the choke valve several times.

6.8.2 For more difficult obstructions proceed as follows:

6.8.2.1 With the blast machine off, adjust the blast machine pressure regulator to 0 psi.

6.8.2.2 Close the choke valve, and open the media metering valve by turning the knob fully counterclockwise.

6.8.2.3 Remove the nozzle and nozzle washer, and direct the hose discharge into a container suitable to hold the media.

6.8.2.4 While holding the hose securely, press the control handle and slowly increase pressure at the blast pressure regulator until the machine pressurizes (around 5 psi). A heavy flow of media will come out the end of the hose.

6.8.2.5 Continue until the media is dry or the machine is empty, and then release the control handle.

6.8.2.6 Thoroughly inspect the nozzle holder threads for wear before reconnecting the nozzle washer and nozzle.

WARNING

The threads on the nozzle and nozzle holder must be inspected each time the nozzle is secured to the holder. Check that the threads are not worn, and that the nozzle holder securely grips the nozzle. The nozzle washer must also be inspected for wear. Worn nozzle washers cause thread erosion. A loose fitting nozzle may eject from the holder under pressure and could cause severe injury.

7.0 TROUBLESHOOTING

Refer to the control schematic in Figure 8 to confirm that control line connections are correct.

WARNING

To avoid serious injury, observe the following when troubleshooting the machine and remote controls.

- **Turn off the compressed air and Lockout (Be certain the air supply is off and that it cannot be started while work is in process) and tagout (Be certain the air supply is clearly marked to prevent re-starting while work is in process) the compressed air supply.**
- **When checking the controls requires air, always enlist the aid of another person to operate the control handle while holding the nozzle securely and pointing it in a safe direction.**
- **Never strap the remote control handle lever down in the operating position.**

NOTE: This section only identifies conditions and problems in the blast machine and remote control system. Always refer to the appropriate section of this manual, or manuals for accessory equipment, before servicing the equipment.

7.1 Neither Media Nor Air Comes Out The Nozzle While The Machine Is Under Pressure

7.1.1 Depressurize the blast machine. After the pop-up valve has dropped, remove the nozzle, and check for obstruction.

7.1.2 Make sure the media metering valve and choke valve are both open.

7.2 Air Only (No Media) Comes Out The Nozzle

7.2.1 Media metering valve may be closed or needs adjustment. Adjust media flow per Section 4.1.

7.2.2 Blast machine may be empty.

7.2.3 Damp media. See Section 6.8.

7.2.4 Check the media metering valve for obstruction. See Section 6.7.

7.2.5 Blast pressure may be higher than blast machine pressure. Adjust pressure per Section 4.2.

7.2.6 Agitator may be turned off, or requires adjustment. See Section 4.3

7.2.7 Agitator assembly may require service. Inspect agitator assembly per Section 6.6.

7.3 Heavy Media Flow

7.3.1 Make sure the choke valve is open.

7.3.2 Media metering valve may be open too far. Adjust media flow per Section 4.1.

7.3.3 Blast machine pressure may be too high above blast pressure. See Section 4.2

7.4 Media Surging

7.4.1 A certain amount of media surge is normal at start-up. Should the flow of media continue to surge, reduce the amount of media in the air stream by adjusting the metering valve per Section 4.1.

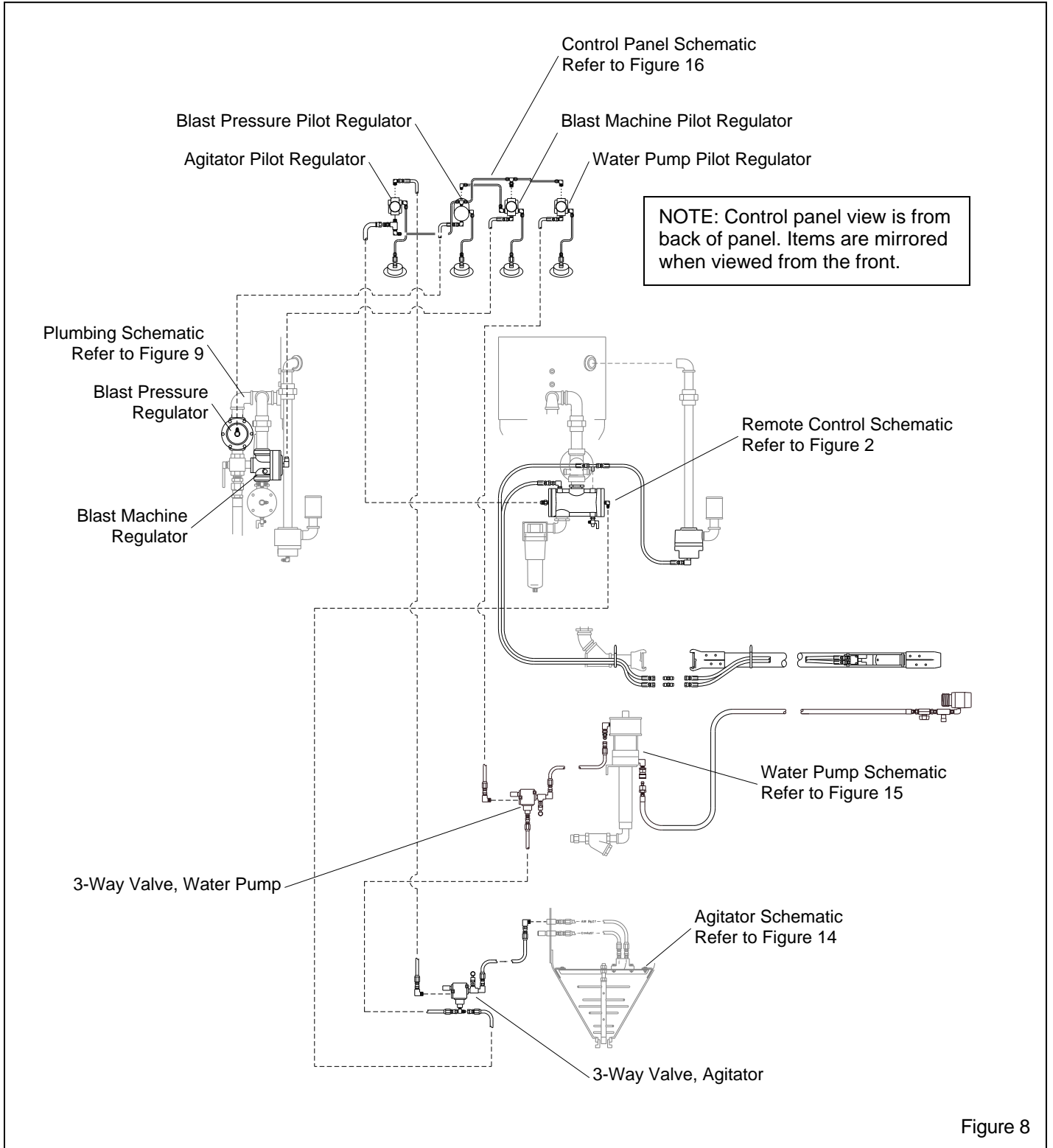


Figure 8

7.5 Intermittent Media Flow

7.5.1 Moisture in the blast machine or in the air supply. Drain moisture from the compressor's receiver tank and the moisture separator/ filter. If moisture problems persist, an air dryer may be required.

7.5.2 Agitator may be turned off or requires adjustment. See Section 4.3.

7.5.3 Agitator assembly may require service. Inspect agitator assembly per Section 6.6.

7.5.4 Media metering valve may need adjustment. See Section 4.1.

7.5.5 Media may be worn out from recycling. Replace media.

7.6 Blast Machine Will Not Pressurize

7.6.1 Make sure that the compressor is on and the air supply valve to the machine is open.

7.6.2 Check the blast pressure regulator. It may be set too low or off.

7.6.3 Make sure the safety petcock on the lower side of the inlet valve is closed.

7.6.4 Check to make sure that the opening on the control handle seals when the handle is pressed. Review the control handle manual.

7.6.5 Check control lines for leaks or breaks.

7.6.6 When the control handle is up air should escape from the opening under the control handle lever. If no air is escaping, the orifice fitting at port number 1 on the inlet valve is blocked, or the line from the fitting to the handle is blocked and must be cleared.

7.6.7 Open the safety petcock, and press the control handle lever; air should come from the petcock. If it doesn't, either the opening under the handle is not sealed off, or the return line between the handle and the inlet valve is blocked and must be cleared.

7.6.8 Close the safety petcock, and press the control handle lever. Make sure no air escapes through the vent hole on the bottom of the inlet valve body. Air escaping from this vent indicates worn U seals in the inlet valve. See Section 6.1.

7.6.9 Inlet valve malfunctioning. Inspect internal parts for wear. See Section 6.1.

7.6.10 Pop-up valve stuck, or internal piping worn or out of alignment. Inspect internal piping.

7.7 Blast Machine Will Not Depressurize Or Depressurizes Too Slowly

7.7.1 Exhaust muffler blocked. See Section 6.5.

7.7.2 Check for blockage in the control handle, or control hose. Review the control handle manual.

7.7.3 Check the fitting in port number 1 on the inlet valve (shown in Figure 5). It must have a .052" orifice.

7.7.4 Remote control valves malfunctioning. Inspect the inlet and outlet valves per Sections 6.1 and 6.2.

7.8 Outlet Valve Does Not Seal

7.8.1 Outlet valve diaphragm worn, or outlet valve requires other service. See Section 6.2.

7.9 Water Does Not Atomize

7.9.1 Too much water. Adjust needle valve for less water, and/or decrease the water pump air pressure.

8.0 REPLACEMENT PARTS AND ACCESSORIES**8.1 Accessories**

- (-) Safety Cable, 1-1/2" to 3" OD hose
Recommended safety accessory 15013
- (-) Spanner Wrench
To service inlet and outlet valves 100027

8.2 Blast Machine, Figure 9

Item	Description	Stock No.
1.	Ball valve, 1-1/4" with handle	02397
2.	Handle, 1-1/4" ball valve	22532
3.	Adaptor, 1-1/4" male NPT x male JIC	22529
4.	Pusher line, coupled, 1-1/4" x 19" long	24168
5.	Adaptor, elbow, 1/4" NPT x 3/16" hose	02513
6.	Coupling, 1-1/4" CFP-P	10806
7.	Media metering valve	99555
8.	Wheel 10" rubber	20349
9.	Inspection door assembly, 6" x 8"	02377
10.	Gasket, inspection door, 6" x 8"	02369
11.	Seal, pop-up valve	02325
12.	Muffler, exhaust	05068
13.	Pop-Up valve, 4"	21769
14.	Regulator, 1-1/4" pilot operated	10985
15.	Filter, 1" manual drain	22424
16.	Gasket, coupling, CQGP-3, pack of 10	08853
17.	Inlet valve, complete	21762
18.	Outlet valve, complete	21764
19.	Check valve, 1-1/4" swing	20118
20.*	Pump, water	21481
21.*	Cover, 16" diameter blast machine	02335
22.*	Screen, 16" diameter blast machine	03099
23.*	Coupling, CQPS-2 nylon	08413
24.*	Nozzle holder, NHP-2	04127
25.*	Hose, 1-1/4" x 50' Supa	23106
26.*	Nozzle, TMP-5	23521
27.*	Washer, nozzle, pack of 10	91024

* Models shown are supplied with original, Model 2 accessory package.

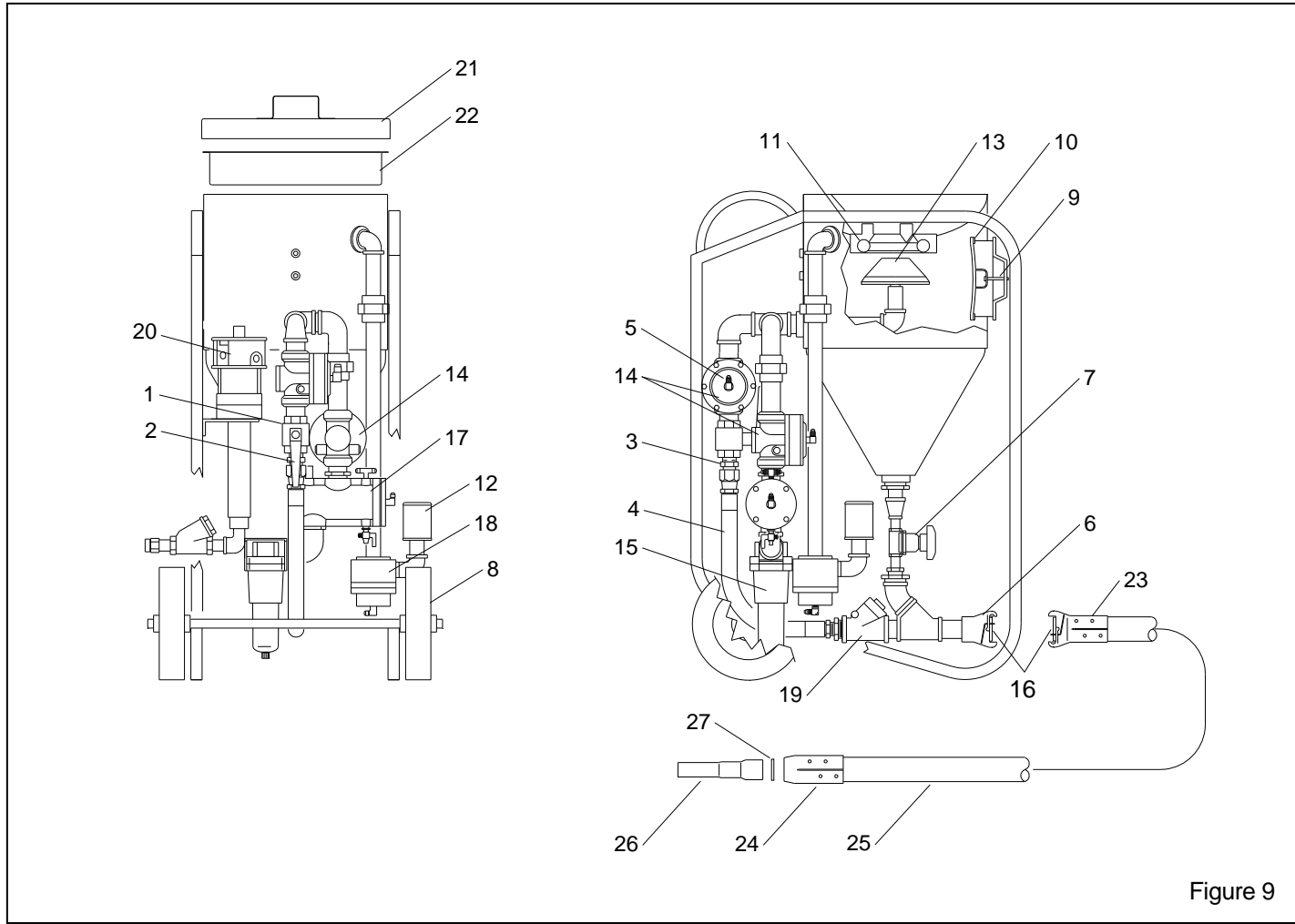


Figure 9

8.3 Remote Control System Parts, Figure 10

Item	Description	Stock No.
1.	Inlet valve, complete	21762
2.	Outlet valve, complete	21764
3.	RLX Control handle	10565
4.	Hose, 3/16" x 18", coupled.	02454
5.	Hose, 3' twinline coupled	02240
6.	Hose, 50' twinline coupled	01951
7.	Union, hose	01944
8.	Hose end, reusable	01943
9.	Tie, nylon	02195

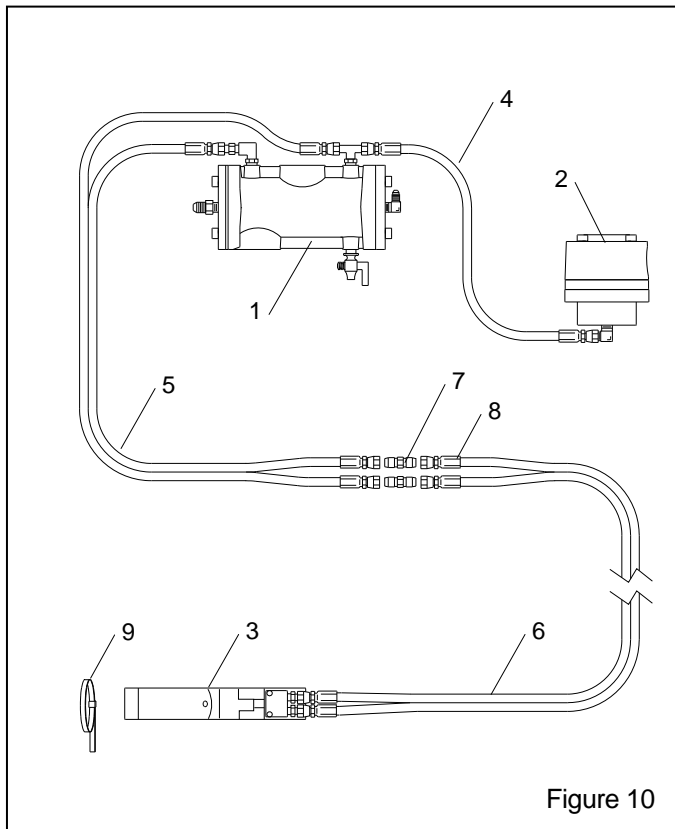


Figure 10

8.4 Inlet Valve, Figure 11

Item	Description	Stock No.
(-)	Inlet Valve, complete	21762
1.	Petcock, 1/4" NPT	01993
2.	Adaptor, 1/8" NPT with .052" orifice	20429
3.	Bushing, 1/4" x 1/8" brass	02010
4.	Elbow, 1/8" brass st.	03993
5.	Adaptor, 1/8" NPT male tee	02495
6.	Body, inlet valve	100022
7.	Cover plate	100076
8.	Gasket, cover plate	100025
9.	Piston, inlet	100021
10.	Screw, 10-mm countersunk socket	100019
11.	Piston, U-seal	100018
12.	U-seal	100020
13.	Screw, 8-mm x 30 socket head	100023
14.	Adaptor, elbow, 1/4" NPT x 3/16" hose	02513
15.	Adaptor, 3/8" hose to 1/4" pipe	01019

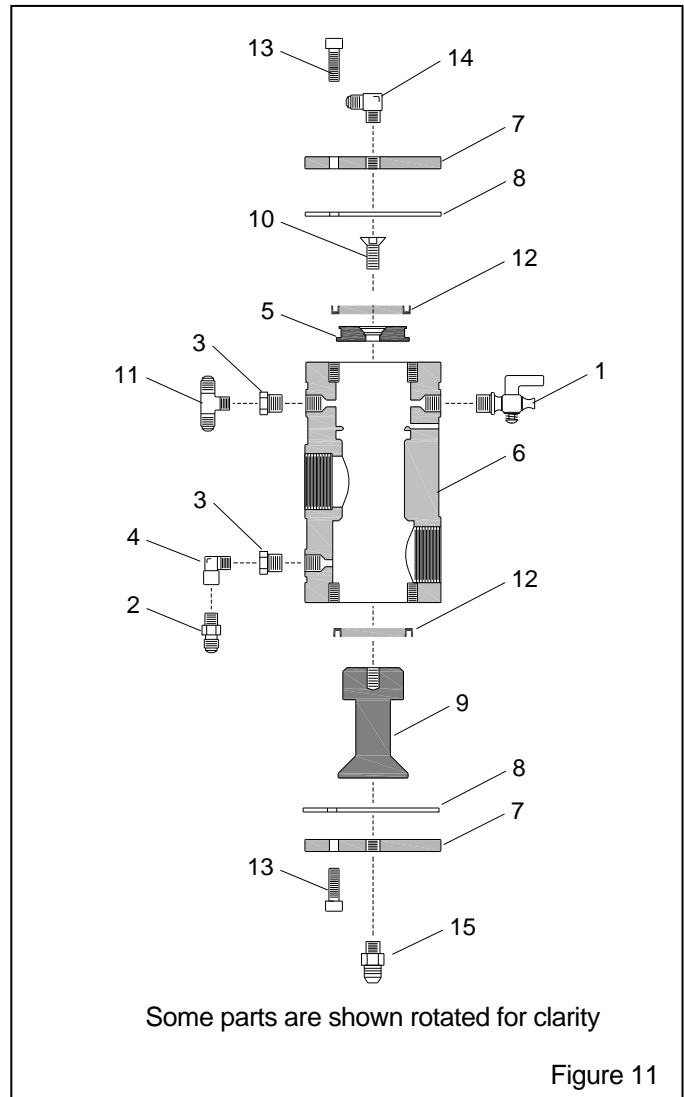


Figure 11

8.5 Outlet Valve, Figure 12

Item	Description	Stock No.
(-)	Outlet valve, complete.....	21764
1.	Upper body, outlet valve	100015
2.	Guide, diaphragm piston.....	100017
3.	Diaphragm	100016
4.	Piston, diaphragm.....	100014
5.	Piston, U-seal	100018
6.	U-seal.....	100020
7.	Adaptor, elbow, 1/4" NPT x 3/16" hose	02513
8.	Screw, 8-mm x 80 socket head	100013
9.	Lower body, outlet valve	100032
10.	Screw, 10-mm countersunk socket	100019

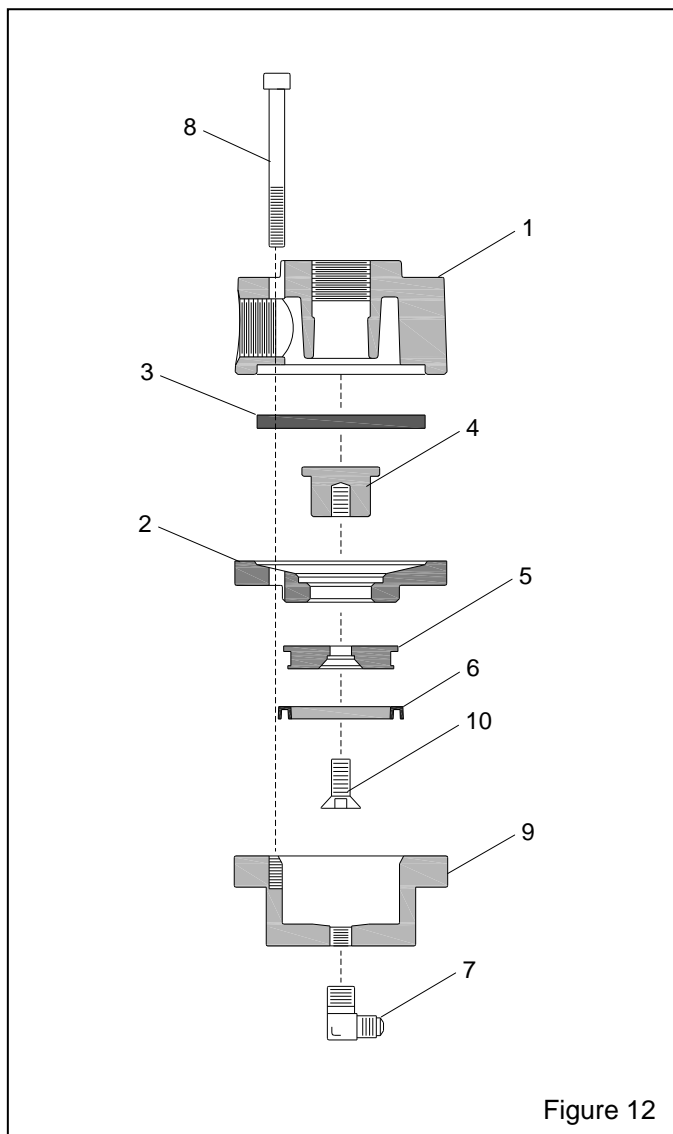


Figure 12

8.6 Media Metering Valve, Figure 13

Item	Description	Stock No.
(-)	Metering valve, 1/2", complete	99555
1.	Valve body	22562
2.	Diaphragm	22563

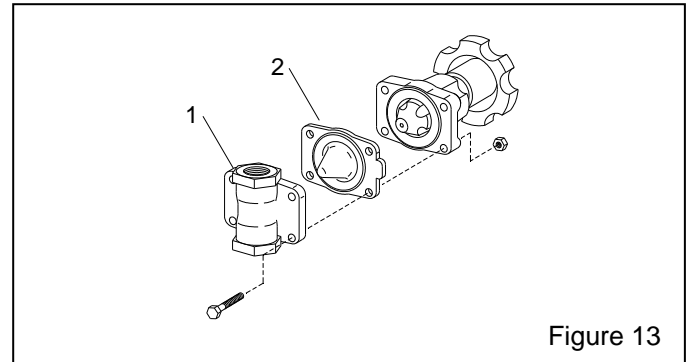


Figure 13

8.7 Agitator Schematic, Figure 14

Item	Description	Stock No.
1.	Agitator, pneumatic	21477
2.	Adaptor, 1/8" NPT.....	01940
3.	Hose, 3/16" x 18", coupled.....	02454
4.	Muffler, 1/4" NPT bronze.....	03988
5.	Pad, agitator mounting	21476
6.	Tine assembly.....	21465
7.	Bracket, agitator mount	21464
8.	Adaptor, 1/4" NPT.....	02494
9.	Screw, 10-32 x 3/4 rh.....	03884
10.	Nut, 10-32 lock.....	12731

11.	Washer, #10 lock.....	03890
12.	Screw, 1/4-nc x 1-1/4" hh cap.....	03054
13.	Washer, 1/4" lock.....	03117
14.	Valve, 3-way air	15931
15.	Nut, 1/2-nc.....	03511
16.	Washer, 1/2" lock.....	03516
17.	Adaptor, 1/8" NPT male tee	02495
18.	Bumper, 1/2" ID hose, 1 foot minimum, cut to fit.....	12458
19.	Adaptor, elbow, 1/4" NPT x 3/16" hose	02513
20.	Hose, 3/16" x 36", coupled.....	02498
21.	Tee, 1/4" NPT male run brass.....	20847
22.	Relief valve, 1/4" NPT, 100 psi.....	21489

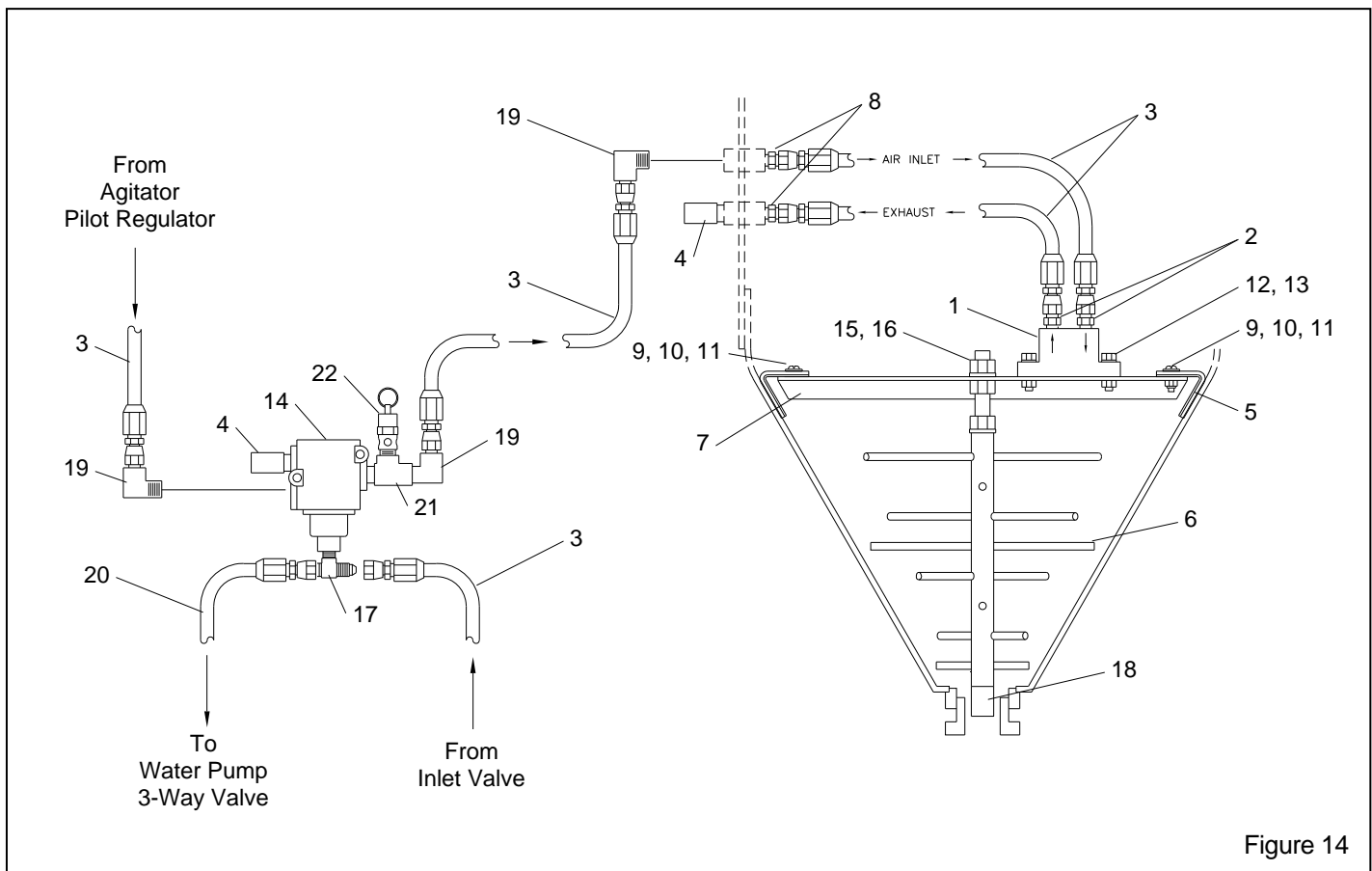


Figure 14

8.8 Water Pump Plumbing Schematic, Figure 15

Item	Description	Stock No.
(-)*	Repair kit, pump air motor, not shown	21765
(-)*	Seal kit, pump air motor, not shown	21766
(-)*	Repair kit, pump material section, not shown	21767
1.	Pump, water	21481
2.	Valve, 3-way air	15931
3.	Strainer, 100 mesh, 3/4" Y	15011
4.	Elbow, 1/4" brass st.	02027
5.	Hose, 50 ft. hydraulic, coupled	05527
6.	Hose, 3/16" x 18", coupled.	02454
7.	Bracket, water pump	21469
8.	Fitting, 3/4" garden hose	05524
9.	Adaptor, elbow, 1/4" NPT x 3/16" hose	02513
10.	Muffler, 1/4" bronze	03988
11.	Valve, 3/8" shut-off	21488
12.	Adaptor, 1/4" NPT	02494

13.	Valve, 1/4" NPT needle	05528
14.	Nipple, 1/4" hex	02808
15.	Adaptor, wet blast, 50-mm	05507
16.	Injector, 1" bore, 50-mm	05509
17.	O-Ring, 1-3/8" ID x 1-1/2" OD	05516
18.	Washer, NW-25 nozzle, pack of 10	91024
19.	Injector assembly	05534
20.	Adaptor assembly, 1" bore, 50-mm	05541
21.	Bushing, 3/8" x 1/4" brass	03528
22.	Hose, 3/16" x 36", coupled	02498
23.	Tee, 1/4" male run NPT brass	20847
24.	Relief valve, 1/4" NPT, 100 psi	21489
25.	Disconnect coupler, 1/4" NPT, high pressure	21790
26.	Disconnect nipple, 1/4" NPT, high pressure	21791
27.	Bushing, brass 1/4" NPT x 1/8" NPT	02010
28.	Adaptor, 1/8" NPT w/ 1/16" orifice	01945

*Refer to the pump manual for items included in repair kits, and additional replacement parts.

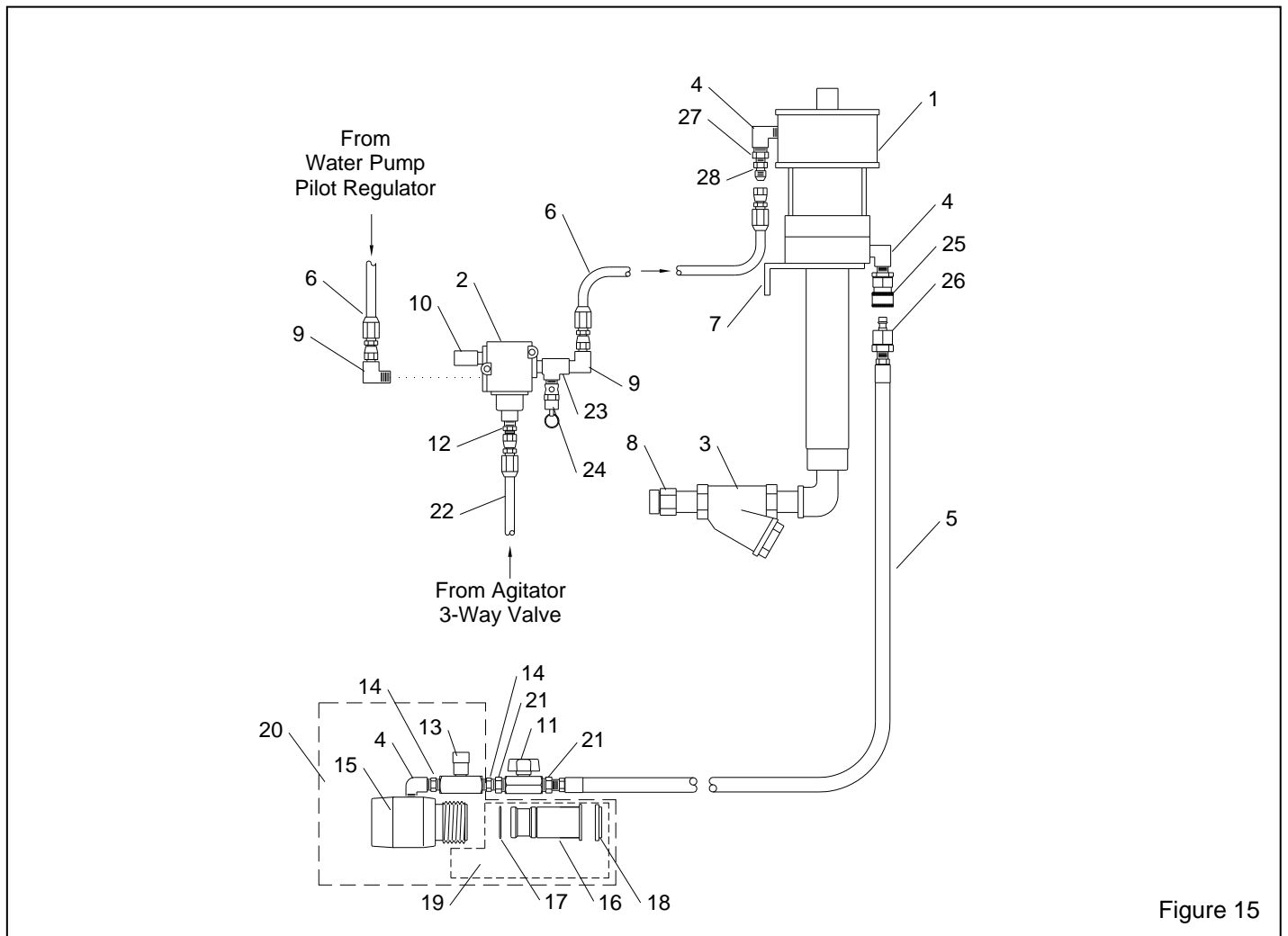


Figure 15

8.9 Control Panel, Figure 16

Item	Description	Stock No.
1.	Gauge, pressure, panel mount	21480
2.	Regulator, 1/4" pilot	21479
3.	Regulator, biasing	12194
4.	Tubing, 1/4" OD blue, specify feet required	05613
5.	Tubing, 1/4" OD green, specify feet required	05614
6.	Tubing, 1/4" OD orange, specify feet required	05615
7.	Adaptor, 1/4" NPT female x 1/4" compression tube	15702

8.	Adaptor, 1/4" NPT elbow x 1/4" compression tube	03428
9.	Adaptor, elbow, 1/4" NPT x 3/16" hose	02513
10.	Adaptor, 1/8" NPT elbow x 1/4" compression tube	15787
11.	Bushing, 1/4" x 1/8" brass	02010
12.	Adaptor, 1/8" NPT tee x 1/4" compression tube	03352
13.	Adaptor, elbow, 1/8" NPT x 3/16" hose	02827
14.	Adaptor, 3/8" hose to 1/4" pipe	01019
15.	Tee, 1/4" male run NPT brass	20847
16.	Hose, 3/8" x 2 ft. coupled	22341
17.	Hose, 3/16" x 18" coupled	02454

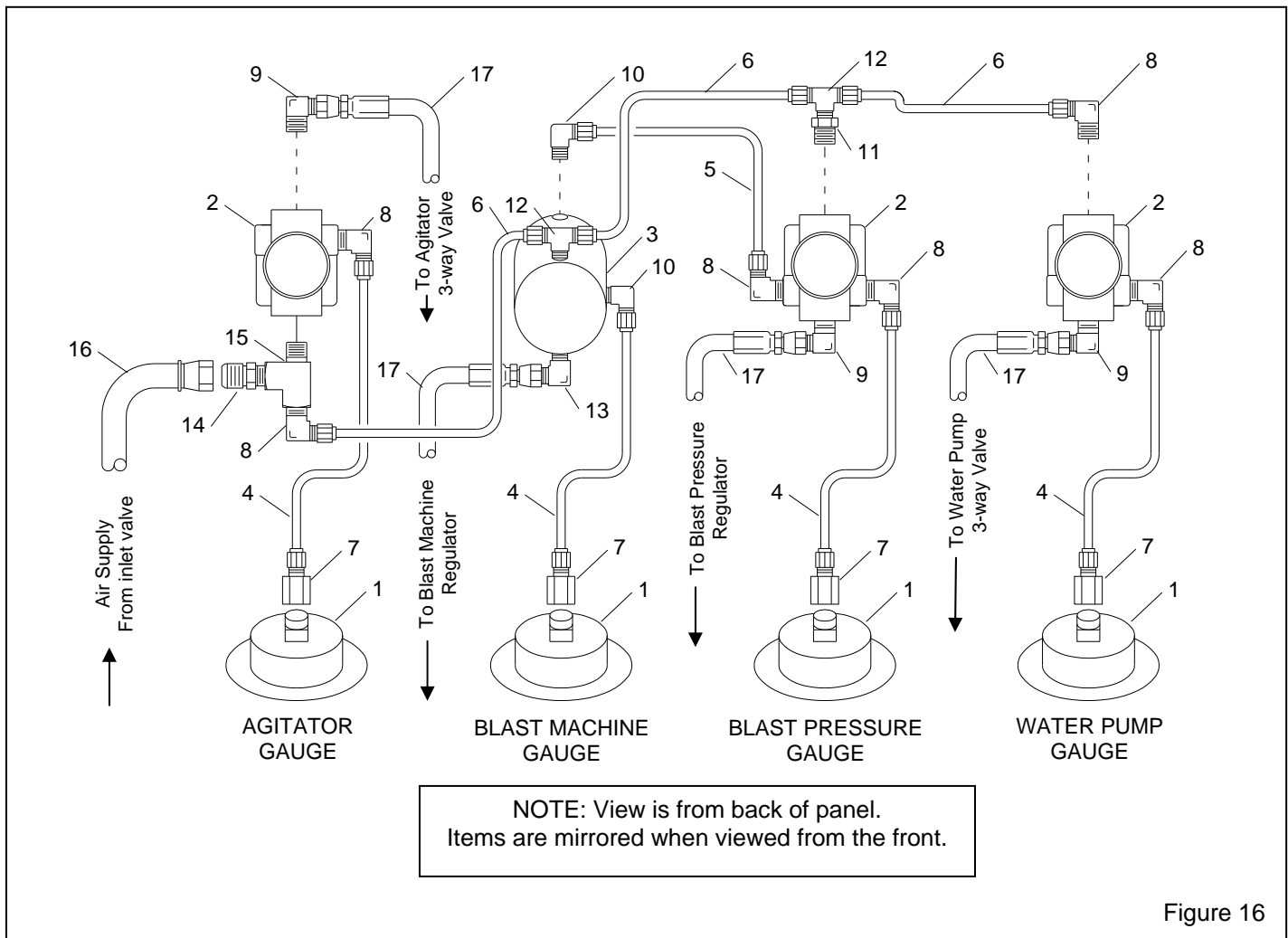


Figure 16